

REMARKS

Claims 1-115 are pending, with claims 1, 9, 17, 25, 45, 52, 60, 82, 88, 94 and 100 being independent. Claims 60-74 have been withdrawn from consideration. Claims 1, 9, 17, 25, 45, 52, 82, 88, 94 and 100 have been amended.

Claims 1-59 and 75-115 have been rejected for obviousness-type double-patenting over claims 1-31 of Yamazaki, U.S. Patent No. 5,700,333 ("Yamazaki"). Applicant requests reconsideration and withdrawal of this rejection for the reasons discussed below.

Independent claim 1 recites a method of manufacturing a semiconductor device including forming an amorphous semiconductor film over a substrate having an insulating surface and providing the amorphous semiconductor film with an element that promotes crystallization of the amorphous semiconductor film. The amorphous semiconductor film undergoes a first heat treatment to form a crystalline semiconductor film. An impurity element belonging to Group 15 is introduced into a first portion of the crystalline semiconductor film by using a mask while a second portion of the crystalline semiconductor film below the mask is not provided with the impurity element. The first and second portions of the semiconductor film are *in contact with the insulating surface* over the substrate. The amorphous semiconductor film is then patterned to form *a crystalline semiconductor island in the second portion* thereby removing the first portion of the crystalline semiconductor film.

Applicant requests reconsideration and withdrawal of the rejection of claim 1 and its dependent claims because the claims of Yamazaki fail to describe or suggest (1) that the "first and second portions of the crystalline semiconductor film are *in contact with the insulating surface* over the substrate," (emphasis added) as recited in claim 1, or (2) "patterning the crystallized semiconductor film to form *a crystalline semiconductor island in the second portion* thereby removing the first portion of the semiconductor film" (emphasis added).

While the specification of Yamazaki may not be relied upon as the basis for a double patenting rejection, reference to the specification provides useful illustration of the subject matter claimed by Yamazaki. As stated in the response mailed on October 14, 2003, in Yamazaki, a first heat treatment is performed to crystallize an amorphous silicon film 203 which has been

coated with a nickel acetate solution to accelerate crystallization (col. 6, lines 14-37).

Phosphorus is then implanted into the resulting crystalline silicon film 204 to form a layer of high concentration phosphorus as shown by the "Xs" in Fig. 2B of Yamazaki (col. 6, lines 38-46). Fig. 2B of Yamazaki also shows that the implanted layer of high concentration phosphorous, which the Examiner seems to equate to the claimed first portion of the crystalline semiconductor film, is not in contact with the silicon oxide film 202, which the Examiner seems to equate to the claimed insulating surface. Rather, the implanted layer of high concentration phosphorus is a gettering layer of depth ranging from 0.1 to 0.2 microns formed on the surface of the crystalline silicon film 204 (col. 6, lines 44-46), and, therefore, is in contact with the undoped portion of the crystalline silicon film 204 and not with the silicon oxide film 202. Accordingly, the implanted layer of high concentration phosphorus is not "in contact with the insulating surface over the substrate" as recited in claim 1.

Moreover, Yamazaki does not describe implanting the phosphorus in the crystalline silicon film 204 using a mask and then forming a *semiconductor island* by patterning the non-implanted portion under the mask. Yamazaki only describes removing the phosphorus implanted portion of the crystalline silicon film 204 using dry etching. Removal of the phosphorus implanted portion of the crystalline silicon film 204 removes the 0.1 or 0.2 micron top surface of the crystalline silicon film 204 (i.e., since the doped portion is only the top 0.1 or 0.2 microns of the film) (Figs. 2B and 2C and col. 6, line 62 to col. 7, line 3), and, therefore, does not "form a crystalline semiconductor island in the second portion thereby removing the first portion of the semiconductor film" as recited in claim 1.

Like the specification, the claims of Yamazaki also fail to describe or suggest having first and second portions of a semiconductor film in contact with an insulating surface over the substrate, or forming a crystalline semiconductor island in the second portion below the mask. Instead, using claim 1 of Yamazaki as an example, the claims merely recite that a gettering layer or a gettering region is formed on or within a semiconductor layer, and that the semiconductor layer and the gettering layer or region are heated to getter metal contained in the semiconductor

layer. Accordingly, for at least these reasons, applicant respectfully requests reconsideration and withdrawal of the double-patenting rejection of claim 1 and its dependent claims.

Independent claims 17, 45, 82, and 88 also recite “wherein the first and second portions of the crystalline semiconductor film are in contact with the insulating surface over the substrate” and “patterning the crystallized semiconductor film to form a crystalline semiconductor island in the second portion thereby removing the first portion of the crystalline semiconductor film.” Accordingly, applicant requests withdrawal of the double patenting rejection of claims 17, 45, 82, and 88, and their dependent claims, for at least the reasons discussed above with reference to claim 1.

Independent claims 94 and 100 also recite “wherein the first and second portions of the crystalline semiconductor film are in contact with the insulating surface over the substrate” and similarly recite “forming a crystalline semiconductor island by removing the first portion and a part of the second portion.” Accordingly, applicant requests withdrawal of the double patenting rejection of claims 94 and 100, and their dependent claims, for at least the reasons discussed above with reference to claim 1.

Independent claims 9 and 25 similarly recite “wherein the second and third portions of the crystalline semiconductor film are in contact with the insulating surface over the substrate” and “patterning the crystalline semiconductor film to form a crystalline semiconductor island in the third portion thereby removing the second portion of the crystalline semiconductor film.” Claim 52 recites “patterning the crystalline semiconductor film to form a crystalline semiconductor island in the second portion thereby removing the first portion of the crystalline semiconductor film.” Accordingly, applicant requests withdrawal of the double patenting rejection of claims 9, 25, and 52, and their dependent claims, for at least the same reasons as those discussed above with reference to claim 1.

Independent claims 1, 9, 82, 88, 94, and 100 also have been rejected along with their dependent claims 2-16, 76, 77, 83-87, 89-93, 95-99, 101-108, and 112-115 as being unpatentable over Yamazaki. However, as discussed above with respect to the double patenting rejection, like the claims of Yamazaki, the entirety of Yamazaki fails to describe or suggest the recited portions

of crystalline semiconductor film in contact with the insulating surface over the substrate or the recited patterning/forming of a crystalline semiconductor island. Accordingly, Applicant requests withdrawal of the rejection of claims 1, 9, 82, 88, 94, and 100 and their dependent claims for at least these reasons.

Independent claims 17, 25, 45, and 52 have been rejected along with their dependent claims 18-24, 26-44, 46-51, 53-59, 75, 78-81, and 109-111 as being unpatentable over Yamazaki in view of Zhang (U.S. Patent No. 5,569,936). Applicant requests reconsideration and withdrawal of this rejection. For the reasons discussed above with respect to the double patenting rejection, Yamazaki does not describe or suggest the subject matter of the independent claims. Moreover, Zhang, which is cited merely for showing the use of lasers to crystallize silicon, does not remedy this failure of Yamazaki. As such, the rejection should be withdrawn.

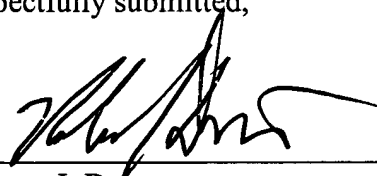
Applicant submits that all claims are in condition for allowance.

Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: _____

6/19/04



Roberto J. Devoto
Reg. No. 55,108

Fish & Richardson P.C.
1425 K Street, N.W.
11th Floor
Washington, DC 20005-3500
Telephone: (202) 783-5070
Facsimile: (202) 783-2331